



# *United Kingdom of Great Britain and Northern Ireland*

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BS NA EN 1993-6 (2007) (English): UK National  
Annex to Eurocode 3. Design of steel structures.  
Crane supporting structures

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NA to BS EN 1993-6:2007



BSI Standards Publication

# **UK National Annex to Eurocode 3: Design of steel structures**

## **Part 6: Crane supporting structures**

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### Summary of pages

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# National Annex (informative) to BS EN 1993-6:2007, *Design of steel structures – Part 6: Crane supporting structures*

## Introduction

This National Annex has been prepared by BSI Subcommittee B/525/31, *Structural use of steel*. In the UK it is to be used in conjunction with BS EN 1993-6:2007.

## NA.1 Scope

This National Annex gives:

- a) the UK decisions for the National Determined Parameters described in the following subclauses of BS EN 1993-6:2007:
 

• 2.1.3.2(1)P	• 3.6.3(1)	• 9.1(2)
• 2.8(2)P	• 6.1(1)	• 9.2(1)P
• 3.2.3(1)	• 6.3.2.3(1)	• 9.2(2)P
• 3.2.3(2)P	• 7.3(1)	• 9.3.3(1)
• 3.2.4(1), Table 3.2	• 7.5(1)	• 9.4.2(5)
• 3.6.2(1)	• 8.2(4)	
- b) the UK decision on the status of BS EN 1993-6:2007 informative Annex A;
- c) references to non-contradictory complementary information.

## NA.2 Nationally Determined Parameters (NDPs)

### NA.2.1 General

UK decisions for the Nationally Determined Parameters decided in BS EN 1993-6:2007 are given in **NA.2.2** to **NA.2.18**.

### NA.2.2 Design working life [BS EN 1993-6:2007, 2.1.3.2(1)P]

The values for the design working life recommended in BS EN 1993-6:2007 should be used.

### NA.2.3 Partial factor $\gamma_{F,test}$ for test loads [BS EN 1993-6:2007, 2.8(2)P]

The value for the partial factor  $\gamma_{F,test}$  for test loads recommended in BS EN 1993-6:2007 should be used.

### NA.2.4 Fracture toughness [BS EN 1993-6:2007, 3.2.3(1)]

The design value of the lowest service temperature for crane supporting structures should be as recommended in NA to BS EN 1993-1-1:2005, **NA.2.6**.

**NA.2.5 Toughness properties for members in compression  
[BS EN 1993-6:2007, 3.2.3(2)P]**

For components under compression, the recommendations given in NA to BS EN 1993-1-10 should be used.

**NA.2.6 Through-thickness properties  
[BS EN 1993-6:2007, 3.2.4(1), Table 3.2]**

The recommendations in Table 3.2 should not be used. Instead the recommendations given in NA to BS EN 1993-1-10:2005, **NA.2.2**, should be followed.

**NA.2.7 Suitable rails and rail steels  
[BS EN 1993-6:2007, 3.6.2(1)]**

Information on suitable rails and rail steels should be obtained from publications of steel producers.

**NA.2.8 Special connecting devices for rails  
[BS EN 1993-6:2007, 3.6.3(1)]**

Information on purpose-made fixings and elastomeric bearing pads for rails should be obtained from publications of specialist manufacturers.

**NA.2.9 Partial factors  $\gamma_{Mi}$  for resistance  
[BS EN 1993-6:2007, 6.1(1)]**

The partial factors  $\gamma_{Mi}$  for the resistances of members and cross-sections should be as given in NA to BS EN 1993-1-1. The partial factors  $\gamma_{Mi}$  for the resistances of joints and connections should be as given in NA to BS EN 1993-1-8.

**NA.2.10 Lateral-torsional buckling resistance  
[BS EN 1993-6:2007, 6.3.2.3(1)]**

The alternative method of assessment given in Annex A of BS EN 1993-6:2007 may be used.

**NA.2.11 Limits for deformations and displacements  
[BS EN 1993-6:2007, 7.3(1)]**

The values recommended in BS EN 1993-6:2007 should be used.

**NA.2.12 Reversible behaviour [BS EN 1993-6:2007, 7.5(1)]**

The partial factor  $\gamma_{M,ser}$  for stresses under characteristic load combinations or test load combinations should be taken as 1,1.

**NA.2.13 Welded connections to top flanges  
[BS EN 1993-6:2007, 8.2(4)]**

The crane classes to be treated as "high fatigue" should be as recommended in BS EN 1993-6:2007.



**NA.2.14 Requirement for fatigue assessment  
[BS EN 1993-6:2007, 9.1(2)]**

The value for the limiting number of cycles  $C_o$  recommended in BS EN 1993-6:2007 should be used.

**NA.2.15 Partial factor for fatigue loads  
[BS EN 1993-6:2007, 9.2(1)P]**

The value for  $\gamma_{ff}$  recommended in BS EN 1993-6:2007 should be used.

**NA.2.16 Partial factor for fatigue resistance  
[BS EN 1993-6:2007, 9.2(2)P]**

BS EN 1993-1-9:2005, Table 3.1 should not be used. Instead the recommendations given in NA to BS EN 1993-1-9:2005, **NA.2.5**, should be followed, using the fatigue loading given in BS EN 1991-3.

**NA.2.17 Local stresses due to wheel loads on the top flange  
[BS EN 1993-6:2007, 9.3.3(1)]**

The crane classes for which the bending stresses  $\sigma_{T,Ed}$  may be neglected should be as recommended in BS EN 1993-6:2007.

**NA.2.18 Multiple crane actions [BS EN 1993-6:2007, 9.4.2(5)]**

The values for  $\lambda_{dup}$  recommended in BS EN 1993-6:2007 should be used.

**NA.3 Decision on the status of informative  
Annex A**

BS EN 1993-6:2007, Annex A may be used.

**NA.4 Reference to non-contradictory  
complementary information (NCCI)**

No non-contradictory complimentary information (NCCI) has been identified.

## Annex NA.A (informative)

**Guidance on the use of runway beams for hoist blocks**

In addition to checking for resistance, see BS EN 1993-6:2007, 6.7, the bottom flanges of runway beams for underslung cranes or hoist blocks should be checked for reversible behaviour, see BS EN 1993-6:2007, 7.5(3), including the effects of local bending stresses due to wheel loads, see BS EN 1993-6:2007, 5.8. Although cases with closely spaced wheels are covered in detail in BS EN 1993-6:2007, 6.7, similarly detailed coverage is not included in BS EN 1993-6:2007, 5.8.

This is not usually a problem for underslung cranes, but the wheel spacing of hoist block trolleys is commonly less than the limit of applicability given in BS EN 1993-6:2007, 5.8(3).

Where the longitudinal wheel spacing  $x_w$  is less than 1,5 times the flange width  $b$ , the local bending stresses due to the combined effect of two wheel loads can be estimated from:

$$\sigma_{02,i} = c_1 c_2 \sigma_{01,i} \quad \text{but} \quad \sigma_{02,i} \geq \sigma_{01,i}$$

$$\begin{aligned} \text{if } x_w < 0,75b: \quad c_1 &= 1 - 0,2(x_w/b)\mu \\ \text{if } x_w \geq 0,75b: \quad c_1 &= 1 - 0,15\mu \\ \text{if } x_w \leq b: \quad c_2 &= 2 - 1,1(x_w/b) + 0,2(x_w/b)^2 \\ \text{if } b < x_w \leq 1,5b: \quad c_2 &= 1,9 - 1,2(x_w/b) + 0,4(x_w/b)^2 \end{aligned}$$

where:

$\mu$  is as defined in BS EN 1993-6:2007, 5.8(4);

$\sigma_{01,i}$  is the local bending stress  $\sigma_{ox,Ed}$  or  $\sigma_{oy,Ed}$  due to one wheel load;

$\sigma_{02,i}$  is the local bending stress  $\sigma_{ox,Ed}$  or  $\sigma_{oy,Ed}$  due to two wheel loads.

**NOTE** This is an approximation based on values tabulated in Appendix G of BS 2853:1957.

## Bibliography

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 2853:1957, *The design and testing of steel overhead runway beams*

BS EN 1991-3, *Actions on structures – Part 3: Actions induced by cranes and machinery*

BS EN 1993-1-9:2005, *Design of steel structures – Part 1-9: Fatigue*

NA to BS EN 1993-1-1:2005, *Design of steel structures – Part 1-1: General rules and rules for buildings*

NA to BS EN 1993-1-8, *Design of steel structures – Part 1-8: Design of joints*

NA to BS EN 1993-1-9:2005, *Design of steel structures – Part 1-9: Fatigue*

NA to BS EN 1993-1-10:2005, *Design of steel structures – Part 1-10: Material toughness and through-thickness properties*





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